Cosmic Frontier Experiment Status

Nov 9, 2015

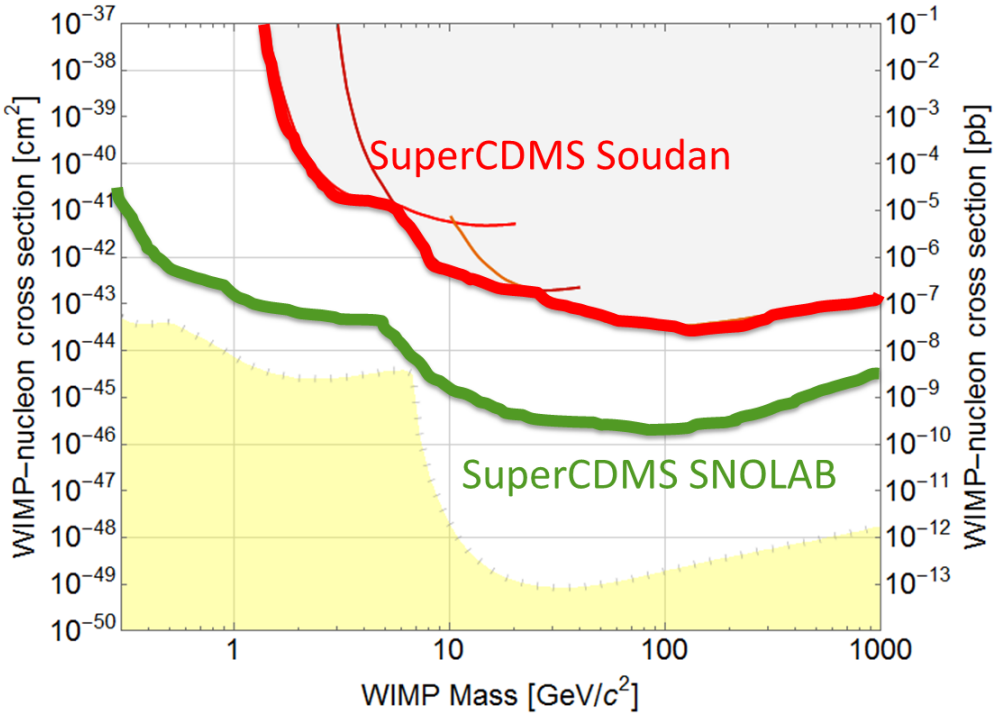
Experiment	Location	Status	Start of operations	Nominal end of operations	Physics
SuperCDMS	Soudan	Operating	Mar 2012	Sep 2015	Dark Matter
COUPP/PICO 2L	SNOLAB	Operating	Dec 2013	Sep 2017	Dark Matter
COUPP/PICO 60	SNOLAB	Operating	June 2013	Sep 2017	Dark Matter
Darkside 50	LNGS (Gran Sasso)	Operating/ Calibrating	Jan 2014	Sep 2017	Dark Matter
DAMIC	SNOLAB	Operating	Dec 2012	Sep 2016	Dark Matter
Dark Energy Survey	CTIO, Chile	Operating	Sep 2013	Feb 2018	Dark Energy
Pierre Auger	Argentina	Operating	2008	Sep 2015 (for FNAL)	High Energy Cosmic Rays
Holometer	Meson Lab	Operating	Sep 2014	Sep 2016	Spacetime

CDMS Soudan: The end of an era

- CDMS-II construction in Soudan started in 1999
- SuperCDMS (new iZIP detectors) >600 live days acquired since Feb 2012
- Since end of WIMP search, acquired ~6 months of calibration data
- Final warmup starts next week, room temp by early December

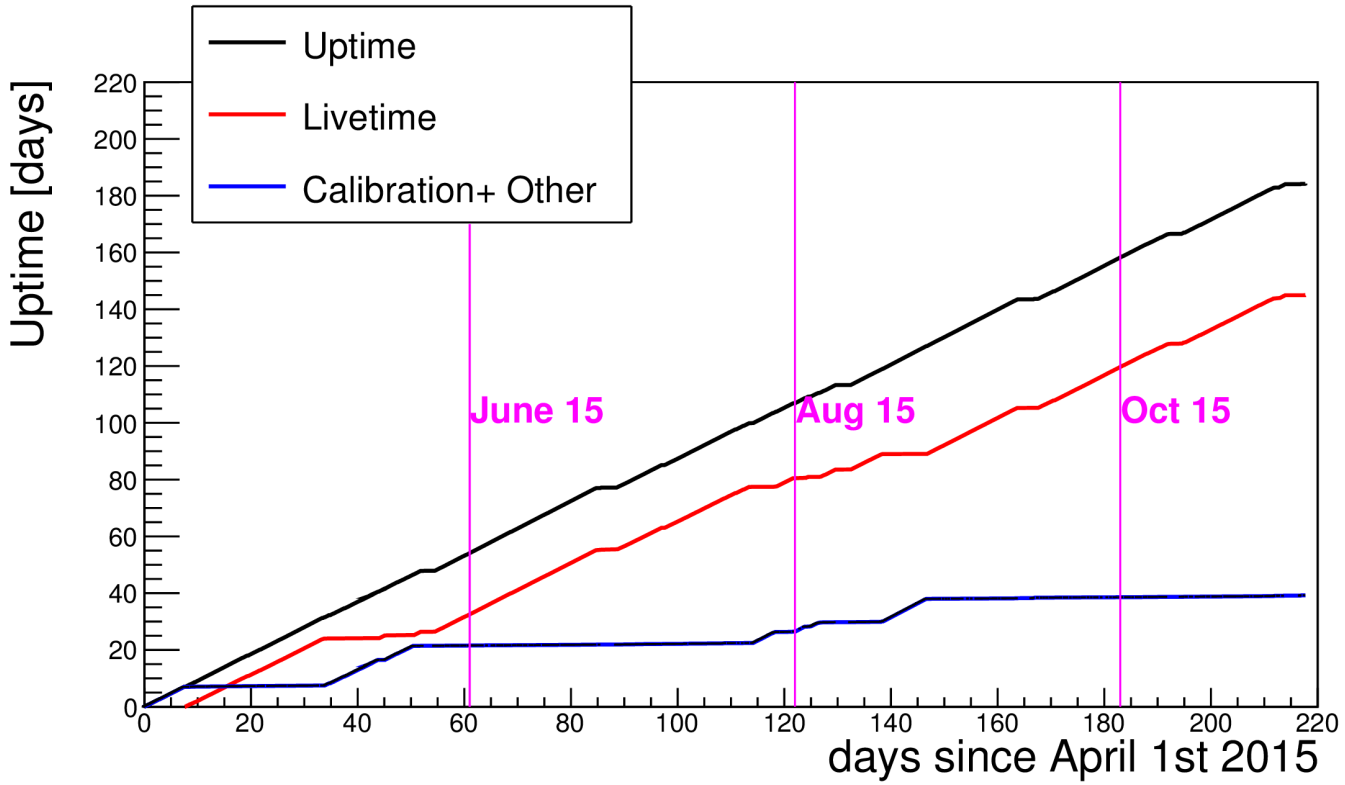
What's next for SuperCDMS?

- New results on both light and heavy WIMPs expected in first half of 2016
- Successful CD-1 Review for SuperCDMS SNOLAB last week!
- Fabrication starts in 2017



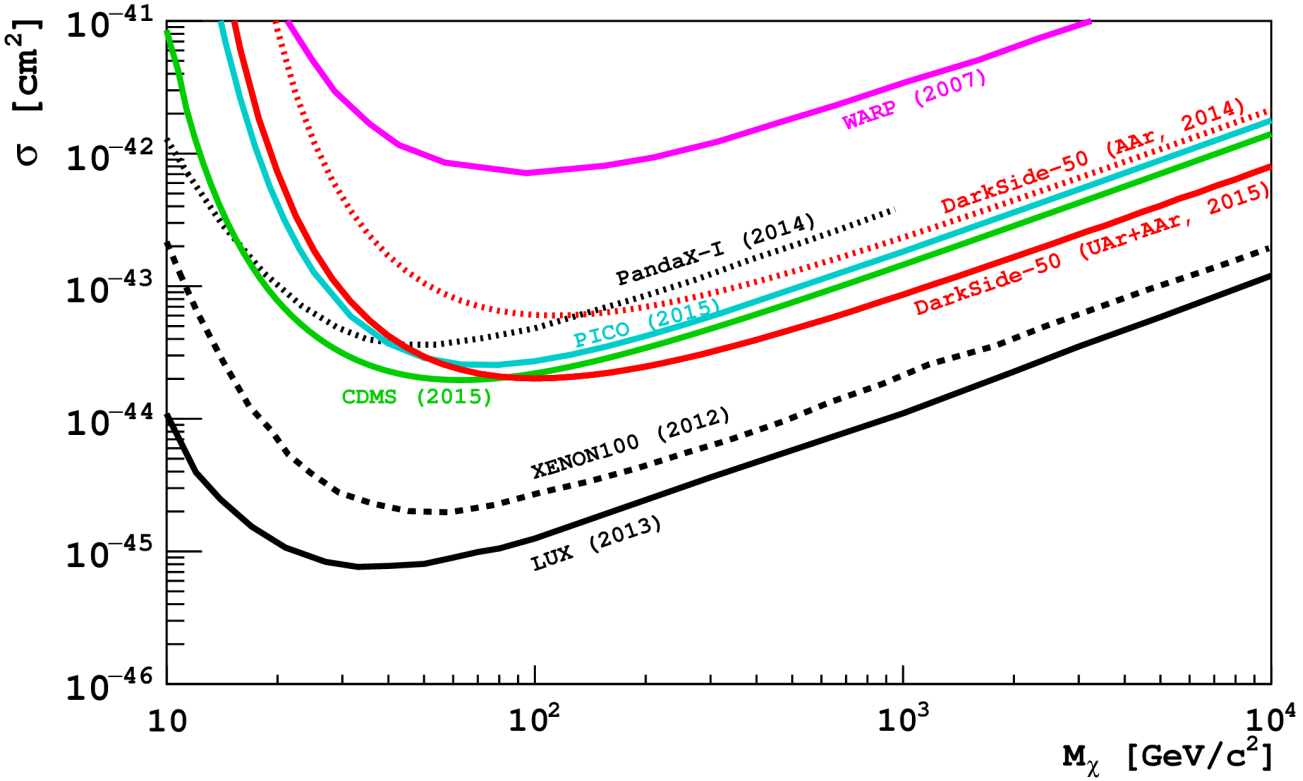
DarkSide-50 Status

- **Running with underground Ar**
  - Uptime in Sept. and Oct.: 86% (52.2 days)
  - DM search livetime in Sept. and Oct.: 84% (51.0 days)
    - 3 planned standard PMTs HV off
    - DAQ maintenance work



DarkSide-50 Status

- **NEW published result**
  - UAr has 1400 less ^{39}Ar than AtmAr. Excellent news!!!
  - New DM limit.
    - Best limit at M_x>100GeV/c^2 with a non Xe target.
    - Background free.

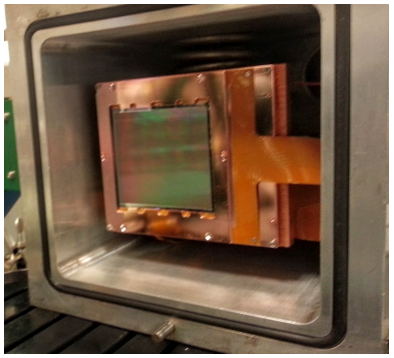


DAMIC – Dark Matter In CCDs

FNAL, UChicago, UMich, Mexico, Argentina, Paraguay, Zurich

September 2015 – October 2015

- Towards DAMIC100:
  - Packaging of 4k x 4k = 16 Mpix CCDs is now in production.
  - Next upgrade on Dec. Will install two new 4x4 CCD and upgrade the inner shield.



- DAMIC@Snolab
  - Taking science-grade data. Using high gain to have the best low energy resolution and lowest noise.
  - Lowest background so far. Need to increase mass to measure it. We will install two new detectors during December.
  - Closed the polyethylene shield to measure it's contribution to the background.

Status: taking data with prototype detectors. Uptime >95%. High quality data.

Y3 Observing Summary (up-to-date)

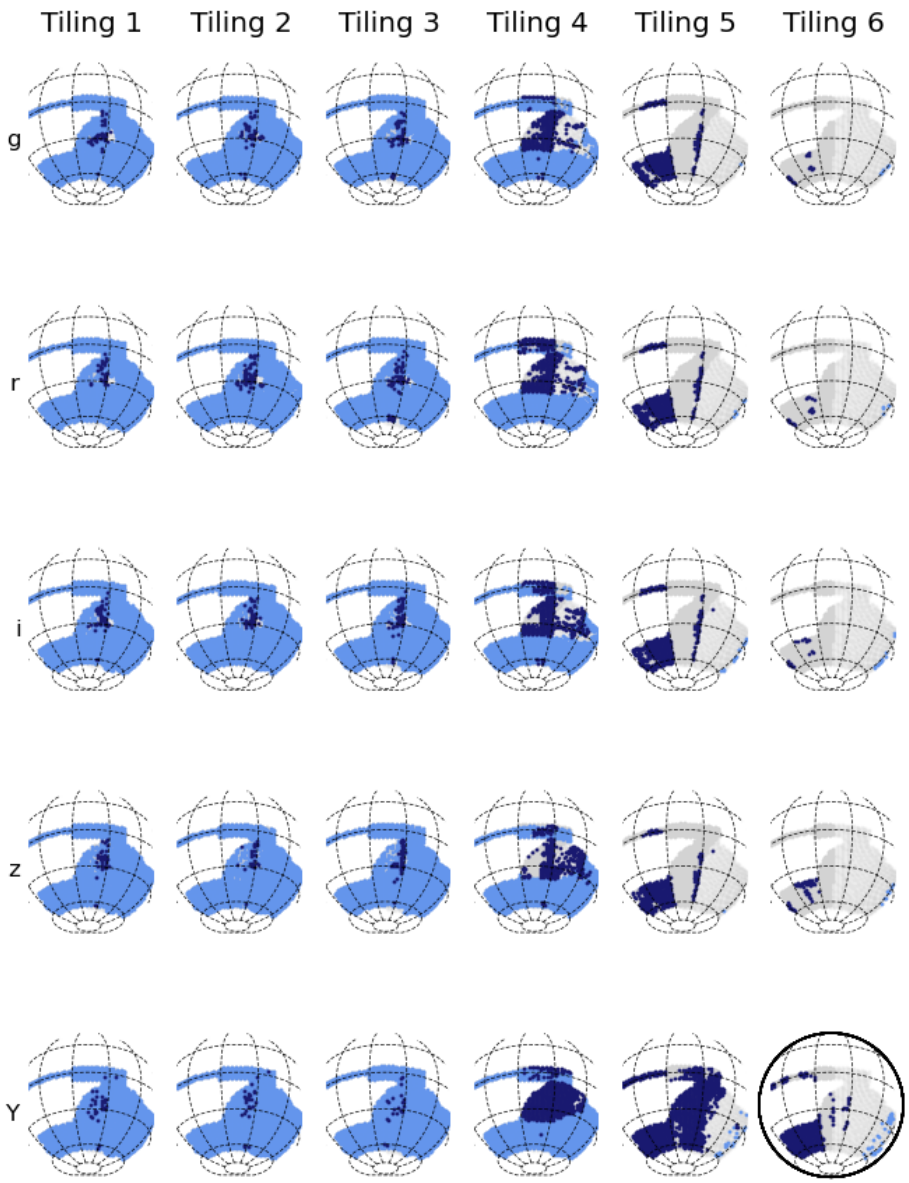
- So far DES has had 61 scheduled observing nights of 105.
- Bad weather (Godzilla el Nino) has caused us to lose more time this season than our most pessimistic simulation. Worst August to October ever seen in 50 years of CTIO.
- Heinous earthquake in Sept that halted observations very briefly (< few nights)

	# Nights	Total Hours	Hours Observing	Lost Camera or Telescope	Lost Obs. Error	Lost Weather
Aug.	10.5	124 ½	58 ½	½ / 17 ½	0	48
Sept.	18.5	188 ¼	91 ¼	1 ¾ / 2	0	93 ¼
Oct.	24	225	139 ¼	3.5 / 2	0	80 ¼
Nov.	8	69	44 ¼	1/4 / ¾	0	23 ¾
Total	**61**	**607**	**333**	**6 / 22 ¼**	**0**	**245**
		100%	**55%**	**1 / 4%**	**0%**	**40%**

Y3 WF Survey Status

	Nights	# WF Images	# WF Good (%)
Aug.	10.5	1010	697 (69%)
Sep.	18.5	2930	1900 (65%)
Oct.	24	2291	1000 (44%)
Nov.	8	2464	1151 (47%)
Total	**61**	**8695**	**4748 (55%)**

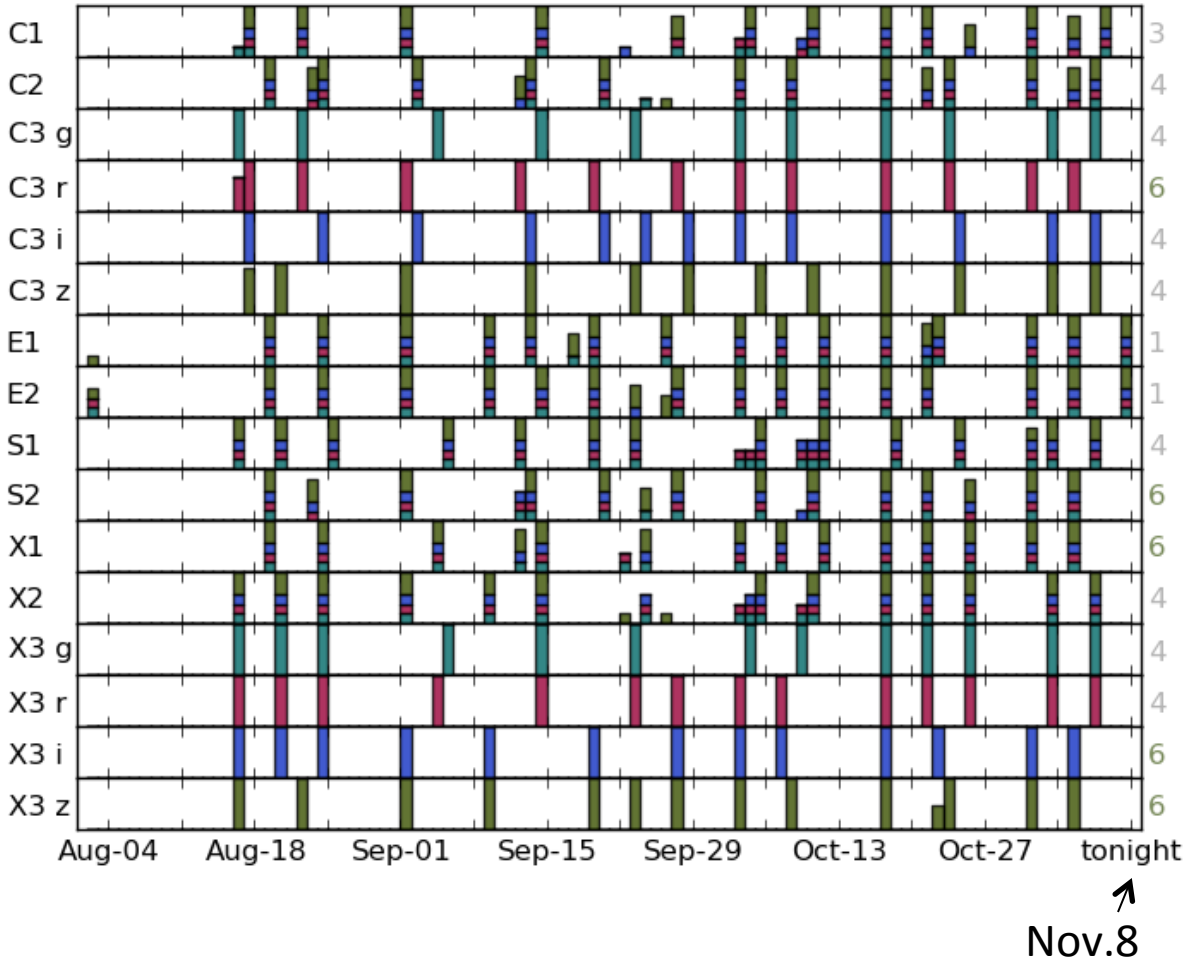
- **Even when we observed, we often had poor conditions. 55% Good images compared to >81% Good in Y1 and Y2**
- About 4 good nights of observing during "dark time" (notice we have many more Y-band than the others in plot to RHS)



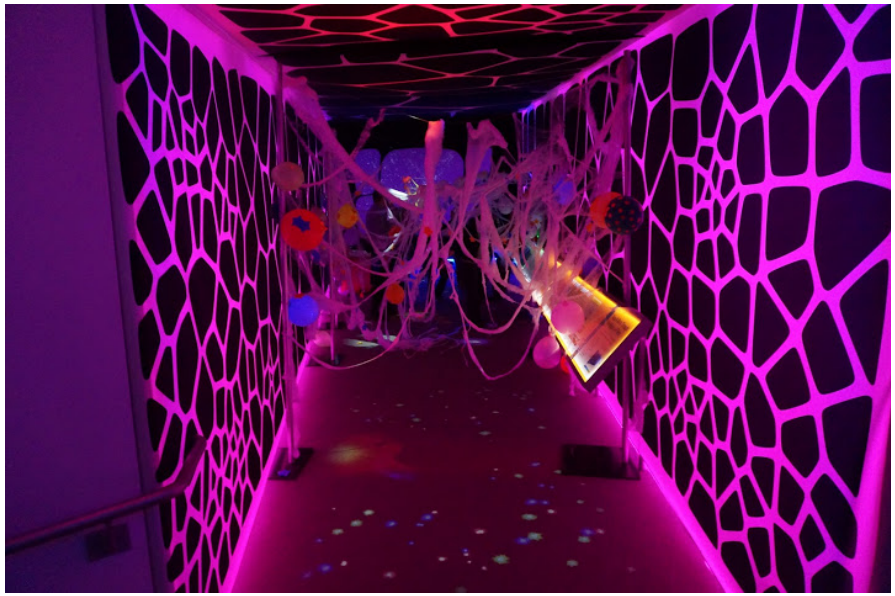
Lt Blue: Y1+Y2, Dk blue: Y3, Red: last night

Y3 SN Survey Status

- 10 SN fields (8 shallow, 2 deep fields)
- We'd like to get good SN data about every 6 nights.
- We have. We do exposures for SN at expense of WF survey
- So far so good but …
- Though DES started 8/4 we didn't get any data the first 12 nights. Short season.



DES EPO: Adler After Dark Halloween



+ other demos, a talk and a panel.

Brief Project Summaries

- Holometer:
  - This month and last month are data analysis.
  - A few graduate students are graduating or will graduate soon.
- PICO/COUPP
  - Pico 2l run is over
    - Now in calibration stage, measuring gamma rejection,
    - a paper from that run is in preparation: showing the reduction in background
    - the run was a success with an event rate consistent with neutrons).
  - Pico 60 upgrade is progressing.
    - online circulation/purification system installed and tested.
    - There was a problem with the seal between the jar and the bellows that we are currently fixing.
    - Should be running with just water by the end of the month